

SEQUENCE LISTING

<110> Hastings, Gregg et al.

<120> Novel Hyaluronan-Binding Proteins and Encoding Genes

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<140> Unassigned

<141> 1999-12-20

<150> 60/113,871

<151> 1998-12-23

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<170> PatentIn Ver. 2.0

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 Thr Thr Trp Lys Pro Ser Cys Cys Pro Gly His Tyr Gly Ser Glu Cys

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Gln Ala Cys Pro Gly Gly Pro Ser Ser Pro Cys Ser Asp Arg Gly Val	1560	1565	1570	
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Cys Met Asp Gly Met Ser Gly Ser Gly Gln Cys Leu Cys Arg Ser Gly	1575	1580	1585	
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Phe Ala Gly Thr Ala Cys Glu Leu Cys Ala Pro Gly Ala Phe Gly Pro	1590	1595	1600	
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His Cys Gln Ala Cys Arg Cys Thr Val His Gly Arg Cys Asp Glu Gly	1605	1610	1615	
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Leu Gly Gly Ser Gly Ser Cys Phe Cys Asp Glu Gly Trp Thr Gly Pro	1620	1625	1630	1635
cgc tgt gag gtg caa ctg gag ctg cag cct gtg tgt acc cca ccc tgt				5122
Arg Cys Glu Val Gln Leu Glu Leu Gln Pro Val Cys Thr Pro Pro Cys	1640	1645	1650	
gca ccc gag gct gtg tgc cgt gca ggc aac agc tgt gag tgc agc ctg				5170
Ala Pro Glu Ala Val Cys Arg Ala Gly Asn Ser Cys Glu Cys Ser Leu	1655	1660	1665	
ggc tat gaa ggg gat ggc cgt gtg tgt aca gtg gca gac ctg tgc cag				5218
Gly Tyr Glu Gly Asp Gly Arg Val Cys Thr Val Ala Asp Leu Cys Gln	1670	1675	1680	
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Asp Gly His Gly Gly Cys Ser Glu His Ala Asn Cys Ser Gln Val Gly	1685	1690	1695	
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Thr Met Val Thr Cys Thr Cys Leu Pro Asp Tyr Glu Gly Asp Gly Trp	1700	1705	1710	1715
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Ser Cys Arg Ala Arg Asn Pro Cys Thr Asp Gly His Arg Gly Gly Cys	1720	1725	1730	
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Ser Glu His Ala Asn Cys Leu Ser Thr Gly Leu Asn Thr Arg Arg Cys	1735	1740	1745	
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Glu Cys His Ala Gly Tyr Val Gly Asp Gly Leu Gln Cys Leu Glu Glu	1750	1755	1760	
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Val Phe His Leu Gln Ala Thr Ser Gly Pro Tyr Gly Leu Asn Phe Ser	
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Glu Ala Glu Ala Ala Cys Glu Ala Gln Gly Ala Val Leu Ala Ser Phe	
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Pro Gln Leu Ser Ala Ala Gln Gln Leu Gly Phe His Leu Cys Leu Met	
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Gly Trp Leu Ala Asn Gly Ser Thr Ala His Pro Val Val Phe Pro Val	
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Ala Asp Cys Gly Asn Gly Arg Val Gly Ile Val Ser Leu Gly Ala Arg	
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Lys Asn Leu Ser Glu Arg Trp Asp Ala Tyr Cys Phe Arg Val Gln Asp	
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Val Ala Cys Arg Cys Arg Asn Gly Phe Val Gly Asp Gly Ile Ser Thr	
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Cys Asn Gly Lys Leu Leu Asp Val Leu Ala Ala Thr Ala Asn Phe Ser	
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Thr Phe Tyr Gly Met Leu Leu Gly Tyr Ala Asn Ala Thr Gln Arg Gly	
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Leu Asp Phe Leu Asp Phe Leu Asp Asp Glu Leu Thr Tyr Lys Thr Leu	
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Phe Val Pro Val Asn Glu Gly Phe Val Asp Asn Met Thr Leu Ser Gly	
	1960 1965 1970
cca aac ttg gag ctg cat gcc tcc aac gcc acc ctc cta agt gcc aac	6130
Pro Asn Leu Glu Leu His Ala Ser Asn Ala Thr Leu Leu Ser Ala Asn	
	1975 1980 1985
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Ala Ser Gln Gly Lys Leu Leu Pro Ala His Ser Gly Leu Ser Leu Ile	
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Ile Ser Asp Ala Gly Pro Asp Asn Ser Ser Trp Ala Pro Val Ala Pro	
	2005 2010 2015

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His Ile Leu Glu Asp Thr Arg Thr Gln Gln Thr Arg Arg Trp Trp Thr
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 Ser Tyr Lys Tyr Lys Asp Gln Pro Gln Gln Thr Phe Asn Ile Tyr Lys
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 Ala Asn Asn Ile Ala Ala Asn Gly Val Phe His Val Val Thr Gly Leu
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 Arg Trp Gln Ala Pro Ser Gly Thr Pro Gly Asp Pro Lys Arg Thr Ile
 115 120 125
 Gly Gln Ile Leu Ala Ser Thr Glu Ala Phe Ser Arg Phe Glu Thr Ile
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 Leu Glu Asn Cys Gly Leu Pro Ser Ile Leu Asp Gly Pro Gly Pro Phe
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 Thr Val Phe Ala Pro Ser Asn Glu Ala Val Asp Ser Leu Arg Asp Gly
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 Arg Leu Ile Tyr Leu Phe Thr Ala Gly Leu Ser Lys Leu Gln Glu Leu
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 Val Arg Tyr His Ile Tyr Asn His Gly Gln Leu Thr Val Glu Lys Leu
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 245 250 255
 Asp Gly Ile Leu Leu Pro Pro Thr Ile Leu Pro Ile Leu Pro Lys His
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 Gln Ala Leu Asn Thr Ser Thr Cys Pro Pro Asn Ser Val Lys Leu Asp
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 Ile Phe Pro Lys Glu Cys Val Tyr Ile His Asp Pro Thr Gly Leu Asn
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 Val Leu Lys Lys Gly Cys Ala Ser Tyr Cys Asn Gln Thr Ile Met Glu
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 Gln Gly Cys Cys Lys Gly Phe Phe Gly Pro Asp Cys Thr Gln Cys Pro
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 Gly Gly Phe Ser Asn Pro Cys Tyr Gly Lys Gly Asn Cys Ser Asp Gly
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 Ile Gln Gly Asn Gly Ala Cys Leu Cys Phe Pro Asp Tyr Lys Gly Ile
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Ala Cys His Ile Cys Ser Asn Pro Asn Lys His Gly Glu Gln Cys Gln
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 Glu Asp Cys Gly Cys Val His Gly Leu Cys Asp Asn Arg Pro Gly Ser
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 Gly Gly Val Cys Gln Gln Gly Thr Cys Ala Pro Gly Phe Ser Gly Arg
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 Gln Trp Leu Lys Ser Ala Gly Ile Thr Leu Pro Ala Asp Arg Arg Val
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 Thr Ala Leu Val Pro Ser Glu Ala Ala Val Arg Gln Leu Ser Pro Glu
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 Asp Arg Ala Phe Trp Leu Gln Pro Arg Thr Leu Pro Asn Leu Val Arg
 625 630 635 640
 Ala His Phe Leu Gln Gly Ala Leu Phe Glu Glu Glu Leu Ala Arg Leu
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 Gly Gly Gln Glu Val Ala Thr Leu Asn Pro Thr Thr Arg Trp Glu Ile
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 Arg Asn Ile Ser Gly Arg Val Trp Val Gln Asn Ala Ser Val Asp Val
 675 680 685
 Ala Asp Leu Leu Ala Thr Asn Gly Val Leu His Ile Leu Ser Gln Val

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Phe Val Pro Thr Asn Arg Ser Leu Glu Ala Gln Gly Asn Ser Ser His 755 760 765		
Leu Asp Ala Asp Thr Val Arg His His Val Val Leu Gly Glu Ala Leu 770 775 780		
Ser Met Glu Thr Leu Arg Lys Gly Gly His Arg Asn Ser Leu Leu Gly 785 790 795 800		
Pro Ala His Trp Ile Val Phe Tyr Asn His Ser Gly Gln Pro Glu Val 805 810 815		
Asn His Val Pro Leu Glu Gly Pro Met Leu Glu Ala Pro Gly Arg Ser 820 825 830		
Leu Ile Gly Leu Ser Gly Val Leu Thr Val Gly Ser Ser Arg Cys Leu 835 840 845		
His Ser His Ala Glu Ala Leu Arg Glu Lys Cys Val Asn Cys Thr Arg 850 855 860		
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Ser Cys Val Tyr Arg Ser Gly Phe Ser Phe Ser Arg Gly Cys Ser Tyr 885 890 895		
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Gly Thr Leu Cys Glu Pro Cys Pro Gly Gly Leu Gly Gly Val Cys Ser 915 920 925		
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Cys His Glu Gly Phe His Gly Thr Ala Cys Glu Val Cys Glu Leu Gly 945 950 955 960		
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 Lys Leu Ala Ala Ile Leu Arg Gly His Met Ile Arg Asn Val Glu Ala
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 Leu Ala Ser Asp Leu Pro Asn Leu Gly Pro Leu Arg Thr Met His Gly
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 Thr Pro Ile Ser Phe Ser Cys Ser Arg Thr Arg Pro Gly Glu Leu Met
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 Val Gly Glu Asp Asp Ala Arg Ile Val Gln Arg His Leu Pro Phe Glu
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Ala Ser Phe Pro Gln Leu Ser Ala Ala Gln Gln Leu Gly Phe His Leu 825 1830 1835 1840		
Cys Leu Met Gly Trp Leu Ala Asn Gly Ser Thr Ala His Pro Val Val 1845 1850 1855		
Phe Pro Val Ala Asp Cys Gly Asn Gly Arg Val Gly Ile Val Ser Leu 1860 1865 1870		
Gly Ala Arg Lys Asn Leu Ser Glu Arg Trp Asp Ala Tyr Cys Phe Arg 1875 1880 1885		
Val Gln Asp Val Ala Cys Arg Cys Arg Asn Gly Phe Val Gly Asp Gly 1890 1895 1900		
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Asn Phe Ser Thr Phe Tyr Gly Met Leu Leu Gly Tyr Ala Asn Ala Thr 1925 1930 1935		
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Lys Thr Leu Phe Val Pro Val Asn Glu Gly Phe Val Asp Asn Met Thr
1955 1960 1965

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Ser Ala Asn Ala Ser Gln Gly Lys Leu Leu Pro Ala His Ser Gly Leu
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Ser Leu Ile Ile Ser Asp Ala Gly Pro Asp Asn Ser Ser Trp Ala Pro
2005 2010 2015

Val Ala Pro Gly Thr Val Val Val Ser Arg Ile Ile Val Trp Asp Ile
2020 2025 2030

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Asp	Tyr	Glu	Gly	Asp	Gly	Trp	Ser	Cys	Arg	Ala	Arg	Asn	Pro	Cys	Thr	
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Gly	Gln	Pro	Pro	Pro	Cys	His	Ser	Asp	Ala	Met	Cys	Thr	Asp	Leu	His	
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ttc	cag	gag	aaa	cgg	gct	ggc	gtt	ttc	cac	ctc	cag	gcc	acc	agc	ggc	342
Phe	Gln	Glu	Lys	Arg	Ala	Gly	Val	Phe	His	Leu	Gln	Ala	Thr	Ser	Gly	
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Pro	Tyr	Gly	Leu	Asn	Phe	Ser	Glu	Ala	Glu	Ala	Ala	Cys	Glu	Ala	Gln	
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Asp Tyr Glu Gly Asp Gly Trp Ser Cys Arg Ala Arg Asn Pro Cys Thr
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Asp Gly His Arg Gly Gly Cys Ser Glu His Ala Asn Cys Leu Ser Thr
25 30 35 40
ggc ctg aac aca cgg cgc tgt gag tgc cac gca ggc tac gta ggc gat 198
Gly Leu Asn Thr Arg Arg Cys Glu Cys His Ala Gly Tyr Val Gly Asp
45 50 55
gga ctg cag tgt ctg gag gag tcg gaa cca cct gtg gac cgc tgc ttg 246
Gly Leu Gln Cys Leu Glu Glu Ser Glu Pro Pro Val Asp Arg Cys Leu
60 65 70
ggc cag cca ccg ccc tgc cac tca gat gcc atg tgc act gac ctg cac 294
Gly Gln Pro Pro Pro Cys His Ser Asp Ala Met Cys Thr Asp Leu His
75 80 85
ttc cag gag aaa cgg gct ggc gtt ttc cac ctc cag gcc acc agc ggc 342
Phe Gln Glu Lys Arg Ala Gly Val Phe His Leu Gln Ala Thr Ser Gly
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cct tat ggt ctg aac ttt tcg gag gct gag gcg gca tgc gaa gca cag 390
Pro Tyr Gly Leu Asn Phe Ser Glu Ala Glu Ala Ala Cys Glu Ala Gln
105 110 115 120

gga gcc gtc ctt gct tca ttc cct cag ctc tct gct gcc cag cag ctg	438
Gly Ala Val Leu Ala Ser Phe Pro Gln Leu Ser Ala Ala Gln Gln Leu	
125 130 135	
ggc ttc cac ctg tgc ctc atg ggc tgg ctg gcc aat ggc tcc act gcc	486
Gly Phe His Leu Cys Leu Met Gly Trp Leu Ala Asn Gly Ser Thr Ala	
140 145 150	
cac cct gtg gtt ttc cct gtg gcg gac tgt ggc aat ggt cgg gtg ggc	534
His Pro Val Val Phe Pro Val Ala Asp Cys Gly Asn Gly Arg Val Gly	
155 160 165	
ata gtc agc ctg ggt gcc cgc aag aac ctc tca gaa cgc tgg gat gcc	582
Ile Val Ser Leu Gly Ala Arg Lys Asn Leu Ser Glu Arg Trp Asp Ala	
170 175 180	
tac tgc ttc cgt gtg caa gat gtg gcc tgc cga tgc cga aat ggc ttc	630
Tyr Cys Phe Arg Val Gln Asp Val Ala Cys Arg Cys Arg Asn Gly Phe	
185 190 195 200	
gtg ggt gac ggg atc agc acg tgc aat ggg aag ctg ctg gat gtg ctg	678
Val Gly Asp Gly Ile Ser Thr Cys Asn Gly Lys Leu Leu Asp Val Leu	
205 210 215	
gct gcc act gcc aac ttc tcc acc ttc tat ggg atg cta ttg ggc tat	726
Ala Ala Thr Ala Asn Phe Ser Thr Phe Tyr Gly Met Leu Leu Gly Tyr	
220 225 230	
gcc aat gcc acc cag cgg ggt ctc gac ttc ctg gac ttc ctg gat gat	774
Ala Asn Ala Thr Gln Arg Gly Leu Asp Phe Leu Asp Phe Leu Asp Asp	
235 240 245	
gag ctc acg tat aag aca ctc ttc gtc cct gtc aat gaa ggc ttt gtg	822
Glu Leu Thr Tyr Lys Thr Leu Phe Val Pro Val Asn Glu Gly Phe Val	
250 255 260	
gac aac atg acg ctg agt ggc cca aac ttg gag ctg cat gcc tcc aac	870
Asp Asn Met Thr Leu Ser Gly Pro Asn Leu Glu Leu His Ala Ser Asn	
265 270 275 280	
gcc acc ctc cta agt gcc aac gcc agc cag ggg aag ttg ctt ccg gcc	918
Ala Thr Leu Leu Ser Ala Asn Ala Ser Gln Gly Lys Leu Leu Pro Ala	
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His Ser Gly Leu Ser Leu Ile Ile Ser Asp Ala Gly Pro Asp Asn Ser	
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tcc tgg gcc cct gtg gcc cca ggg aca gtt gtg gtt agc cgt atc att	1014
Ser Trp Ala Pro Val Ala Pro Gly Thr Val Val Val Ser Arg Ile Ile	
315 320 325	
gtg tgg gac atc atg gcc ttc aat ggc atc atc cat gct ctg gcc agc	1062
Val Trp Asp Ile Met Ala Phe Asn Gly Ile Ile His Ala Leu Ala Ser	
330 335 340	
ccc ctc ctg gca ccc cca cag ccc cag gca gtg ctg gcg cnt gaa gcc	1110
Pro Leu Leu Ala Pro Pro Gln Pro Gln Ala Val Leu Ala Xaa Glu Ala	

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 Pro Pro Val Ala Ala Gly Val Gly Ala Val Leu Ala Ala Gly Ala Leu
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 ctt ggc ttg gtg gcc gga gct ctc tac ctc cgt gcc cga ggc aag ccc 1206
 Leu Gly Leu Val Ala Gly Ala Leu Tyr Leu Arg Ala Arg Gly Lys Pro
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 atg ggc ttt ggc ttc tct gcc ttc cag gcg gaa gat gat gct gat gac 1254
 Met Gly Phe Gly Phe Ser Ala Phe Gln Ala Glu Asp Asp Ala Asp Asp
 395 400 405
 gan ttc tca ccg tgg caa gaa ggg acc aac ccc acn ttg gtn tnt gtc 1302
 Xaa Phe Ser Pro Trp Gln Glu Gly Thr Asn Pro Xaa Leu Xaa Xaa Val
 410 415 420
 ccc aac cct gtc ttt ggc agc gac acc ttt tgt gaa ccc ttc gat gac 1350
 Pro Asn Pro Val Phe Gly Ser Asp Thr Phe Cys Glu Pro Phe Asp Asp
 425 430 435 440
 tca ctg ctg gag gag gac ttc cct gac acc cag agg atc ctc aca gtc 1398
 Ser Leu Leu Glu Glu Asp Phe Pro Asp Thr Gln Arg Ile Leu Thr Val
 445 450 455
 aag tga cgaggctggg gctgaaagca gaagcatgca caggaggag accantttta 1454
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 Glu His Ala Asn Cys Leu Ser Thr Gly Leu Asn Thr Arg Arg Cys Glu
 35 40 45
 Cys His Ala Gly Tyr Val Gly Asp Gly Leu Gln Cys Leu Glu Glu Ser
 50 55 60
 Glu Pro Pro Val Asp Arg Cys Leu Gly Gln Pro Pro Pro Cys His Ser
 65 70 75 80
 Asp Ala Met Cys Thr Asp Leu His Phe Gln Glu Lys Arg Ala Gly Val
 85 90 95
 Phe His Leu Gln Ala Thr Ser Gly Pro Tyr Gly Leu Asn Phe Ser Glu

1158
 1206
 1254
 1302
 1350
 1398
 1454
 1514
 1522

100	105	110
Ala Glu Ala Ala Cys Glu Ala Gln Gly Ala Val Leu Ala Ser Phe Pro 115	120	125
Gln Leu Ser Ala Ala Gln Gln Leu Gly Phe His Leu Cys Leu Met Gly 130	135	140
Trp Leu Ala Asn Gly Ser Thr Ala His Pro Val Val Phe Pro Val Ala 145	150	155
Asp Cys Gly Asn Gly Arg Val Gly Ile Val Ser Leu Gly Ala Arg Lys 165	170	175
Asn Leu Ser Glu Arg Trp Asp Ala Tyr Cys Phe Arg Val Gln Asp Val 180	185	190
Ala Cys Arg Cys Arg Asn Gly Phe Val Gly Asp Gly Ile Ser Thr Cys 195	200	205
Asn Gly Lys Leu Leu Asp Val Leu Ala Ala Thr Ala Asn Phe Ser Thr 210	215	220
Phe Tyr Gly Met Leu Leu Gly Tyr Ala Asn Ala Thr Gln Arg Gly Leu 225	230	235
Asp Phe Leu Asp Phe Leu Asp Asp Glu Leu Thr Tyr Lys Thr Leu Phe 245	250	255
Val Pro Val Asn Glu Gly Phe Val Asp Asn Met Thr Leu Ser Gly Pro 260	265	270
Asn Leu Glu Leu His Ala Ser Asn Ala Thr Leu Leu Ser Ala Asn Ala 275	280	285
Ser Gln Gly Lys Leu Leu Pro Ala His Ser Gly Leu Ser Leu Ile Ile 290	295	300
Ser Asp Ala Gly Pro Asp Asn Ser Ser Trp Ala Pro Val Ala Pro Gly 305	310	315
Thr Val Val Val Ser Arg Ile Ile Val Trp Asp Ile Met Ala Phe Asn 325	330	335
Gly Ile Ile His Ala Leu Ala Ser Pro Leu Leu Ala Pro Pro Gln Pro 340	345	350
Gln Ala Val Leu Ala Xaa Glu Ala Pro Pro Val Ala Ala Gly Val Gly 355	360	365
Ala Val Leu Ala Ala Gly Ala Leu Leu Gly Leu Val Ala Gly Ala Leu 370	375	380
Tyr Leu Arg Ala Arg Gly Lys Pro Met Gly Phe Gly Phe Ser Ala Phe 385	390	395
Gln Ala Glu Asp Asp Ala Asp Asp Xaa Phe Ser Pro Trp Gln Glu Gly 405	410	415

100 105 110
 115 120 125
 130 135 140
 145 150 155 160
 165 170 175
 180 185 190
 195 200 205
 210 215 220
 225 230 235 240
 245 250 255
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 275 280 285
 290 295 300
 305 310 315 320
 325 330 335
 340 345 350
 355 360 365
 370 375 380
 385 390 395 400
 405 410 415

Thr Asn Pro Xaa Leu Xaa Xaa Val Pro Asn Pro Val Phe Gly Ser Asp
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Ala Ala Lys Ala Val Cys Gly Gly His Ala Thr Tyr Lys Ala Ala Arg
35 40 45

Lys Gly His Val Cys Ala Ala Gly Trp Met Ala Lys Gly Arg Val Gly
50 55 60

Tyr Val Lys Gly Asn Cys Gly Gly Lys Thr Gly Asp Tyr Gly Arg Asn
65 70 75 80

Arg Ser Arg Trp Asp Ala Tyr Cys Tyr Asn His Ala Lys Cys Gly Gly
85 90 95

Val Thr Asp Lys Arg Lys Ser Gly Asn Tyr Asp Asn Cys Tyr Trp His
100 105 110

Arg Lys Tyr Gly Arg His Ser Asp Asp Asp Asp Gly Cys Ala Asp Tyr
115 120 125

Val Tyr Asp Ser Tyr Asp Asp Val His Gly Val Gly Arg Tyr Cys Gly
130 135 140

Asp Asp Asp Ser Thr Gly Asn Val Met Thr Lys Ser Asp Ala Ser Val
145 150 155 160

Thr Ala Gly Gly Lys Tyr Val Ala Met Asp Val Ser Lys Ser Ser Gly
165 170 175

Lys Asn Thr Ser Thr Thr Ser Thr Gly Asn Lys Asn Ala Gly Arg Ser
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His

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atg ggc ctg ttg ctc ctg gtc cca ttg ctc ctg ctg ccc ggc tcc tac	165					
Met Gly Leu Leu Leu Leu Val Pro Leu Leu Leu Leu Pro Gly Ser Tyr						
1 5 10 15						
gga ctg ccc ttc tac tac ggc ttc tac tac tcc aac agc gcc aac gac	213					
Gly Leu Pro Phe Tyr Tyr Gly Phe Tyr Tyr Ser Asn Ser Ala Asn Asp						
20 25 30						
cag aac cta ggc aac ggt cat ggc aaa gac cta cnt aat gga gtg aag	261					
Gln Asn Leu Gly Asn Gly His Gly Lys Asp Leu Xaa Asn Gly Val Lys						
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ctg gtg gtg gag aca ccc gag gag acc ctg ttc acc tac caa ggg gcc	309					
Leu Val Val Glu Thr Pro Glu Glu Thr Leu Phe Thr Tyr Gln Gly Ala						
50 55 60						
agt gtg atc ctg ccc tgc cgc tac cgc tac gag ccg gcc ctg gtc tcc	357					
Ser Val Ile Leu Pro Cys Arg Tyr Arg Tyr Glu Pro Ala Leu Val Ser						
65 70 75 80						
ccg cgg cgt gtg cgt gtc aaa tgg tgg aag ctg tcg gag aac ggg gcc	405					
Pro Arg Arg Val Arg Val Lys Trp Trp Lys Leu Ser Glu Asn Gly Ala						
85 90 95						
cca gag aag gac gtg ctg gtg gcc atc ggg ctg agg cac cgc tcc ttt	453					
Pro Glu Lys Asp Val Leu Val Ala Ile Gly Leu Arg His Arg Ser Phe						
100 105 110						
ggg gac tac caa ggc cgc gtg cac ctg cgg cag gac aaa gag cat gac	501					
Gly Asp Tyr Gln Gly Arg Val His Leu Arg Gln Asp Lys Glu His Asp						
115 120 125						
gtc tcg ntg gag atc cag gnt ctg cgg ctg gag gac tat ggg cgt tac	549					
Val Ser Xaa Glu Ile Gln Xaa Leu Arg Leu Glu Asp Tyr Gly Arg Tyr						
130 135 140						
cgc tgt gag gtc atn gac ggg ctg gag gat gaa agc ggt ctg gtg gag	597					
Arg Cys Glu Val Xaa Asp Gly Leu Glu Asp Glu Ser Gly Leu Val Glu						
145 150 155 160						
ctg gag ctg cgg ggt gtg gtc ttt cct tac cag tcc ccc aac ggg cgc	645					
Leu Glu Leu Arg Gly Val Val Phe Pro Tyr Gln Ser Pro Asn Gly Arg						
165 170 175						
tac cag ttc aac ttc cac gag ggc cag cag gtc tgt gca gag cag gct	693					
Tyr Gln Phe Asn Phe His Glu Gly Gln Gln Val Cys Ala Glu Gln Ala						
180 185 190						
gcg gtg gtg gcc tcc ttt gag cag ctc ttc cgg gcc tgg gag gag ggc	741					
Ala Val Val Ala Ser Phe Glu Gln Leu Phe Arg Ala Trp Glu Glu Gly						
195 200 205						
ctg gac tgg tgc aac gcg ggc tgg ctg cag gat gcc acg gtg cag tac	789					
Leu Asp Trp Cys Asn Ala Gly Trp Leu Gln Asp Ala Thr Val Gln Tyr						
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ccc atc atg ttg ccc cgg cag ccc tgc ggt ggc ccg gac ctg gca cct	837					

aaa t
Lys

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			20					25					30		
Gln	Asn	Leu	Gly	Asn	Gly	His	Gly	Lys	Asp	Leu	Xaa	Asn	Gly	Val	Lys
		35					40					45			
Leu	Val	Val	Glu	Thr	Pro	Glu	Glu	Thr	Leu	Phe	Thr	Tyr	Gln	Gly	Ala
	50					55					60				
Ser	Val	Ile	Leu	Pro	Cys	Arg	Tyr	Arg	Tyr	Glu	Pro	Ala	Leu	Val	Ser
65					70					75					80
Pro	Arg	Arg	Val	Arg	Val	Lys	Trp	Trp	Lys	Leu	Ser	Glu	Asn	Gly	Ala
				85					90					95	
Pro	Glu	Lys	Asp	Val	Leu	Val	Ala	Ile	Gly	Leu	Arg	His	Arg	Ser	Phe
			100					105					110		
Gly	Asp	Tyr	Gln	Gly	Arg	Val	His	Leu	Arg	Gln	Asp	Lys	Glu	His	Asp
		115					120					125			
Val	Ser	Xaa	Glu	Ile	Gln	Xaa	Leu	Arg	Leu	Glu	Asp	Tyr	Gly	Arg	Tyr
	130					135					140				
Arg	Cys	Glu	Val	Xaa	Asp	Gly	Leu	Glu	Asp	Glu	Ser	Gly	Leu	Val	Glu
145					150					155					160
Leu	Glu	Leu	Arg	Gly	Val	Val	Phe	Pro	Tyr	Gln	Ser	Pro	Asn	Gly	Arg
				165					170					175	
Tyr	Gln	Phe	Asn	Phe	His	Glu	Gly	Gln	Gln	Val	Cys	Ala	Glu	Gln	Ala

180	185	190
Ala Val Val Ala Ser Phe Glu Gln Leu Phe Arg Ala Trp Glu Glu Gly		
195	200	205
Leu Asp Trp Cys Asn Ala Gly Trp Leu Gln Asp Ala Thr Val Gln Tyr		
210	215	220
Pro Ile Met Leu Pro Arg Gln Pro Cys Gly Gly Pro Asp Leu Ala Pro		
225	230	235
Gly Val Arg Ser Tyr Gly Pro Arg His Arg Arg Leu His Arg Tyr Asp		
	245	250
Val Phe Cys Phe Ala Thr Ala Leu Xaa Gly Arg Val Tyr Tyr Leu Xaa		
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His Pro Glu Xaa Leu Xaa Leu Thr Xaa Ala Arg Glu Ala Cys Gln Glu		
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		285

Lys

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 35 40 45
 Ile Phe Ser Gln Arg Gly Gly Asn Val Thr Leu Pro Cys Lys Phe Tyr
 50 55 60
 His Glu His Thr Ser Thr Ala Gly Ser Gly Thr His Lys Ile Arg Val
 65 70 75 80
 Lys Trp Thr Lys Leu Thr Ser Asp Tyr Leu Lys Glu Val Asp Val Phe
 85 90 95
 Val Ala Met Gly His His Arg Lys Ser Tyr Gly Lys Tyr Gln Gly Arg
 100 105 110
 Val Phe Leu Arg Glu Ser Ser Glu Asn Asp Ala Ser Leu Ile Ile Thr
 115 120 125
 Asn Ile Met Leu Glu Asp Tyr Gly Arg Tyr Lys Cys Glu Val Ile Glu
 130 135 140
 Gly Leu Glu Asp Asp Thr Ala Val Val Ala Leu Asn Leu Glu Gly Val
 145 150 155 160

Val Phe Pro Tyr Ser Pro Arg Leu Gly Arg Tyr Asn Leu Asn Phe His
 165 170 175
 Glu Ala Gln Gln Ala Cys Leu Asp Gln Asp Ser Ile Ile Ala Ser Phe
 180 185 190
 Asp Gln Leu Tyr Glu Ala Trp Arg Ser Gly Leu Asp Trp Cys Asn Ala
 195 200 205
 Gly Trp Leu Ser Asp Gly Ser Val Gln Tyr Pro Ile Thr Lys Pro Arg
 210 215 220
 Glu Pro Cys Gly Gly Lys Asn Thr Val Pro Gly Val Arg Asn Tyr Gly
 225 230 235 240
 Phe Trp Asp Lys Glu Arg Ser Arg Tyr Asp Val Phe Cys Phe Thr Ser
 245 250 255
 Asn Phe Asn Gly Arg Phe Tyr Tyr Leu Ile His Pro Thr Lys Leu Thr
 260 265 270
 Tyr Asp Glu Ala Val Gln Ala Cys Leu Lys Asp Gly Ala Gln Ile Ala
 275 280 285
 Lys Val Gly Gln Ile Phe Ala Ala Trp Lys Leu Leu Gly Tyr Asp Arg
 290 295 300
 Cys Asp Ala Gly Trp Leu Ala Asp Gly Ser Val Arg Tyr Pro Ile Ser
 305 310 315 320
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 Gly Phe Pro Asp Lys Lys His Lys Leu Tyr Gly Val Tyr Cys Phe Arg
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 gagcacgcca cctgtaag atg aca ggc cgc ggc aag cac aag tgt gag tgt 231
 Met Thr Gly Pro Gly Lys His Lys Cys Glu Cys
 1 5 10
 aaa agt cac tat gtc gga gat ggg ctg aac tgt gag ccg gag cag ctg 279
 Lys Ser His Tyr Val Gly Asp Gly Leu Asn Cys Glu Pro Glu Gln Leu
 15 20 25

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aaa Lys	tgt Cys 45	gtc Val	gac Asp	ctc Leu	cac His	ttc Phe 50	cag Gln	gat Asp	acc Thr	act Thr	gtt Val 55	ggg Gly	gtg Val	ttc Phe	cat His	375
cta Leu 60	cgc Arg	tcc Ser	cca Pro	ctg Leu	ggc Gly 65	cag Gln	tat Tyr	aag Lys	ctg Leu	acc Thr 70	ttt Phe	gac Asp	aaa Lys	gcc Ala	aga Arg 75	423
gag Glu	gcc Ala	tgt Cys	gcc Ala	aac Asn 80	gaa Glu	gct Ala	gcg Ala	acc Thr	atg Met 85	gca Ala	acc Thr	tac Tyr	aac Asn	cag Gln 90	ctc Leu	471
tcc Ser	tat Tyr	nnc Xaa	cag Gln 95	aag Lys	gcc Ala	aag Lys	tac Tyr	cac His 100	ctg Leu	tgc Cys	tca Ser	gca Ala	ggc Gly 105	tgg Trp	ctg Leu	519
gag Glu	acc Thr	ggg Gly 110	cgg Arg	gtt Val	gcc Ala	tac Tyr	ccc Pro 115	aca Thr	gcc Ala	ttc Phe	gcc Ala	tcc Ser 120	cag Gln	aac Asn	tgt Cys	567
ggc Gly	tct Ser 125	ggt Gly	gtg Val	gtt Val	ggg Gly	ata Ile 130	gtg Val	gac Asp	tat Tyr	gga Gly	cct Pro 135	aga Arg	ccc Pro	aac Asn	aag Lys	615
agt Ser 140	gaa Glu	atg Met	tgg Trp	gat Asp	gtc Val 145	ttc Phe	tgc Cys	tat Tyr	cgg Arg	atg Met 150	aaa Lys	gat Asp	gtg Val	aac Asn	tgc Cys 155	663
acc Thr	tnc Xaa	aag Lys	gtg Val	ggc Gly 160	tat Tyr	gtg Val	gga Gly	gat Asp	ggc Gly 165	ttc Phe	tca Ser	tac Tyr	agt Ser	ggg Gly 170	aac Asn	711
ctg Leu	ctg Leu	cag Gln	gtc Val 175	ctg Leu	atg Met	tcc Ser	ttc Phe	ccc Pro 180	tca Ser	ctc Leu	aca Thr	aac Asn	ttc Phe 185	ctg Leu	acg Thr	759
gaa Glu	gtg Val 190	ctg Leu	gcc Ala	tat Tyr	tcc Ser	aac Asn	agc Ser 195	tca Ser	gct Ala	cga Arg	ggc Gly	cgt Arg 200	gca Ala	ttt Phe	cta Leu	807
gaa Glu	cac His 205	ctg Leu	act Thr	gac Asp	ctg Leu	tcc Ser	atc Ile 210	cgc Arg	ggc Gly	acc Thr	ctc Leu 215	ttt Phe	gtn Xaa	cca Pro	cag Gln	855
aac Asn 220	agt Ser	ggg Gly	ctg Leu	ggg Gly	gag Glu 225	aat Asn	gag Glu	acc Thr	ttg Leu	tct Ser 230	ggg Gly	cgg Arg	gac Asp	atc Ile	gag Glu 235	903
cac His	cac His	ctc Leu	gcc Ala	aat Asn 240	gtc Val	agc Ser	atg Met	ttt Phe	ttc Phe 245	tac Tyr	aat Asn	gac Asp	ctt Leu	gtc Val 250	aat Asn	951
ggc Gly	acc Thr	acc Thr	ctg Leu	caa Gln	acg Thr	agg Arg	ctg Leu	gga Gly	agc Ser	aag Lys	ctg Leu	ctc Leu	atc Ile	act Thr	gac Asp	999

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Arg Gln Asp Pro Leu His Pro Thr Glu Thr Arg Cys Val Asp Gly Arg			
270	275	280	
gac act ctg gag tgg gac atc tgt gcc tcc aat ggg atc aca cat gtc			1095
Asp Thr Leu Glu Trp Asp Ile Cys Ala Ser Asn Gly Ile Thr His Val			
285	290	295	
att tcc agg yct tta aaa gca ccc cct gcc ccc gtg acc ttg ncc cac			1143
Ile Ser Arg Xaa Leu Lys Ala Pro Pro Ala Pro Val Thr Leu Xaa His			
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act ggn ttg gga gna ggg atc ttc tnt gnc atc atc ctg gtg act ggg			1191
Thr Xaa Leu Gly Xaa Gly Ile Phe Xaa Xaa Ile Ile Leu Val Thr Gly			
320	325	330	
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Ala Val Ala Leu Ala Ala Tyr Ser Tyr Phe Arg Ile Asn Arg Lys Thr			
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Gly Asp Gly Leu Asn Cys Glu Pro Glu Gln Leu Pro Ile Asp Arg Cys			
20	25	30	
Leu Gln Asp Asn Gly Gln Cys His Ala Asp Ala Lys Cys Val Asp Leu			
35	40	45	
His Phe Gln Asp Thr Thr Val Gly Val Phe His Leu Arg Ser Pro Leu			
50	55	60	
Gly Gln Tyr Lys Leu Thr Phe Asp Lys Ala Arg Glu Ala Cys Ala Asn			
65	70	75	80
Glu Ala Ala Thr Met Ala Thr Tyr Asn Gln Leu Ser Tyr Xaa Gln Lys			
85	90	95	
Ala Lys Tyr His Leu Cys Ser Ala Gly Trp Leu Glu Thr Gly Arg Val			
100	105	110	
Ala Tyr Pro Thr Ala Phe Ala Ser Gln Asn Cys Gly Ser Gly Val Val			
115	120	125	
Gly Ile Val Asp Tyr Gly Pro Arg Pro Asn Lys Ser Glu Met Trp Asp			
130	135	140	

1047
 1095
 1143
 1191
 1239
 1259

Val Phe Cys Tyr Arg Met Lys Asp Val Asn Cys Thr Xaa Lys Val Gly
 145 150 155 160
 Tyr Val Gly Asp Gly Phe Ser Tyr Ser Gly Asn Leu Leu Gln Val Leu
 165 170 175
 Met Ser Phe Pro Ser Leu Thr Asn Phe Leu Thr Glu Val Leu Ala Tyr
 180 185 190
 Ser Asn Ser Ser Ala Arg Gly Arg Ala Phe Leu Glu His Leu Thr Asp
 195 200 205
 Leu Ser Ile Arg Gly Thr Leu Phe Xaa Pro Gln Asn Ser Gly Leu Gly
 210 215 220
 Glu Asn Glu Thr Leu Ser Gly Arg Asp Ile Glu His His Leu Ala Asn
 225 230 235 240
 Val Ser Met Phe Phe Tyr Asn Asp Leu Val Asn Gly Thr Thr Leu Gln
 245 250 255
 Thr Arg Leu Gly Ser Lys Leu Leu Ile Thr Asp Arg Gln Asp Pro Leu
 260 265 270
 His Pro Thr Glu Thr Arg Cys Val Asp Gly Arg Asp Thr Leu Glu Trp
 275 280 285
 Asp Ile Cys Ala Ser Asn Gly Ile Thr His Val Ile Ser Arg Xaa Leu
 290 295 300
 Lys Ala Pro Pro Ala Pro Val Thr Leu Xaa His Thr Xaa Leu Gly Xaa
 305 310 315 320
 Gly Ile Phe Xaa Xaa Ile Ile Leu Val Thr Gly Ala Val Ala Leu Ala
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Phe

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 Gln Ala Ala Gly Val Tyr His Arg Glu Ala Arg Ala Gly Arg Tyr Lys
 35 40 45

Leu Thr Tyr Ala Glu Ala Lys Ala Val Cys Glu Phe Glu Gly Gly Arg
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 Leu Ala Thr Tyr Lys Gln Leu Glu Ala Ala Arg Lys Ile Gly Phe His
 65 70 75 80
 Val Cys Ala Ala Gly Trp Met Ala Lys Gly Arg Val Gly Tyr Pro Ile
 85 90 95
 Val Lys Pro Gly Pro Asn Cys Gly Phe Gly Lys Thr Gly Ile Ile Asp
 100 105 110
 Tyr Gly Ile Arg Leu Asn Arg Ser Glu Arg Trp Asp Ala Tyr Cys Tyr
 115 120 125
 Asn Pro His Ala Lys Glu Cys Gly Gly Val Phe Thr Asp Pro Lys Arg
 130 135 140
 Ile Phe Lys Ser Pro Gly Phe Pro Asn Glu Tyr Asp Asp Asn Gln Val
 145 150 155 160
 Cys Tyr Trp His Ile Arg Leu Lys Tyr Gly Gln Arg Ile His Leu Ser
 165 170 175
 Phe Leu Asp Phe Asp Leu Glu His Asp Pro Gly Cys Leu Ala Asp Tyr
 180 185 190
 Val Glu Ile Tyr Asp Ser Tyr Asp Asp Val His Gly Phe Val Gly Arg
 195 200 205
 Tyr Cys Gly Asp Glu Leu Pro Glu Asp Ile Ile Ser Thr Gly Asn Val
 210 215 220
 Met Thr Leu Lys Phe Leu Ser Asp Ala Ser Val Thr Ala Gly Gly Phe
 225 230 235 240
 Gln Ile Lys Tyr Val Thr Val Asp Pro Ala Ser Lys Ser Ser Gln Ala
 245 250 255
 Lys Asn Thr Ser Thr Thr Gly Asn Lys Lys Phe Leu Pro Gly Arg Phe
 260 265 270
 Ser His Leu
 275

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44

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 <212> DNA
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acaagagcag gtggcagcag gggaacgtct tctcatgctc cgtgatgcat gaggctctgc 660
acaaccacta cagcgagaag agcctctccc tgtctccggg taaatgagtg cgacggccgc 720
gactctagag gat 733